

# Claims

- [c1] 1. A method for determining the resistivity of fluids from formations surrounding an earth borehole, comprising the steps of:
- providing a coil;
  - determining a reference quality factor of the coil;
  - disposing the coil in the borehole, and causing formation fluid to flow axially through the coil;
  - measuring the quality factor of the coil with formation fluid within; and
  - determining the resistivity of the formation fluid within the coil as a function of said measured quality factor and said reference quality factor.
- [c2] 2. The method as defined by claim 1, wherein said step of measuring the quality factor is performed as formation fluid flows axially through the coil.
- [c3] 3. The method as defined by claim 1, wherein said step of measuring the quality factor is performed with said formation fluid axially within the coil and non-flowing.
- [c4] 4. The method as defined by claim 1, wherein said step of causing fluid to flow axially through the coil com-

prises causing said fluid to flow through a flow line, a portion of which passes axially through said coil.

- [c5] 5. The method as defined by claim 1, further comprising providing a Faraday shield between said coil and said fluid.
- [c6] 6. The method as defined by claim 4, further comprising providing a Faraday shield between said coil and said flow line.
- [c7] 7. The method as defined by claim 4, further comprising providing a Faraday shield between said coil and said flow line, said shield being operative to prevent electrical lines of force associated with distributed capacitance from passing through said formation fluid within said coil during said step of measuring the quality factor of said coil.
- [c8] 8. The method as defined by claim 1, wherein said step of determining a reference quality factor of said coil comprises measuring the quality factor of said coil with an empty flow line axially therein.
- [c9] 9. The method as defined by claim 4, wherein said step of determining a reference quality factor of said coil comprises measuring the quality factor of said coil with a reference fluid in said flow line.

- [c10] 10. The method as defined by claim 1, wherein said step of measuring the quality factor of said coil includes measuring signals sensed at said coil upon electrical excitation of said coil.
- [c11] 11. The method as defined by claim 10, wherein excitation of said coil is implemented by exciting a loop on said flow line.
- [c12] 12. The method as defined by claim 1, wherein said step of determining the resistivity of the formation fluid within said coil further comprises determining the dielectric constant of said formation fluid within the coil.
- [c13] 13. The method as defined by claim 1, wherein said step of determining the quality factor of the coil with formation fluid therein includes measuring signals sensed at said coil upon electrical excitation at a plurality of frequencies.
- [c14] 14. The method as defined by claim 12, wherein said step of determining the quality factor of the coil with formation fluid therein includes measuring signals sensed at said coil upon electrical excitation at a plurality of frequencies.
- [c15] 15. The method as defined by claim 13, wherein excita-

tion of said coil is implemented by exciting a loop on said flow line.

[c16] 16. The method as defined by claim 14, wherein excitation of said coil is implemented by exciting a loop on said flow line.

[c17] 17. A method for determining the dielectric constant of fluids from formations surrounding an earth borehole, comprising the steps of:  
providing a coil;  
determining a reference quality factor of the coil;  
disposing the coil in the borehole, and causing formation fluid to flow axially through the coil;  
measuring the quality factor of the coil with formation fluid within; and  
determining the dielectric constant of the formation fluid within the coil as a function of said measured quality factor and said reference quality factor.

[c18] 18. The method as defined by claim 17, wherein said step of determining the quality factor of the coil with formation fluid therein includes measuring signals sensed at said coil upon electrical excitation at a plurality of frequencies.

[c19] 19. A method for determining the resistivity of fluids

from formations surrounding an earth borehole, comprising the steps of:

- providing a formation testing logging device that includes a coil and a flow line passing axially through said coil;
- determining a reference quality factor of the coil;
- positioning the formation testing device in the borehole, and causing formation fluid to flow through the flow line;
- measuring the quality factor of the coil with formation fluid in the flow line; and
- determining the resistivity of the formation fluid in the flow line as a function of said measured quality factor and said reference quality factor.

[c20] 20. The method as defined by claim 19, wherein said step of measuring the quality factor is performed as formation fluid flows axially through the coil.

[c21] 21. The method as defined by claim 19, wherein said step of measuring the quality factor is performed with said formation fluid axially within the coil and non-flowing.

[c22] 22. The method as defined by claim 19, further comprising providing a Faraday shield between said coil and said flow line.

[c23] 23. The method as defined by claim 19, further comprising providing a Faraday shield between said coil and said flow line, said shield being operative to prevent electrical lines of force associated with distributed capacitance from passing through said formation fluid within said coil during said step of measuring the quality factor of said coil.

[c24] 24. The method as defined by claim 19, wherein said step of determining a reference quality factor of said coil comprises measuring the quality factor of said coil with said flow line empty.

[c25] 25. The method as defined by claim 19, wherein said step of determining a reference quality factor of said coil comprises measuring the quality factor of said coil with a reference fluid in said flow line.

[c26] 26. The method as defined by claim 19, wherein said step of measuring the quality factor of said coil includes measuring signals sensed at said coil upon electrical excitation of said coil.

[c27] 27. The method as defined by claim 26, wherein excitation of said coil is implemented by exciting a loop on said flow line.

[c28] 28. The method as defined by claim 19, wherein said step of determining the resistivity of the formation fluid within said coil further comprises determining the dielectric constant of said formation fluid within the coil.

[c29] 29. The method as defined by claim 19, wherein said step of determining the quality factor of the coil with formation fluid therein includes measuring signals sensed at said coil upon electrical excitation at a plurality of frequencies.